AMENDMENTS TO THE DRAWINGS:

Applicants respectfully submit a sheet of corrected drawing in compliance with 37 C.F.R. § 1.121(d) and 37 C.F.R. § 1.84(c).

REMARKS

I. PENDING CLAIMS AND SUPPORT FOR AMENDMENTS

Upon entry of this amendment, claims 1-18 will be pending in this application. Applicant has amended Figure 1 of the drawings to indicate that this figure illustrates "Prior Art" as suggested by the Examiner. No new matter has been added.

II. INDICATION OF ALLOWABLE SUBJECT MATTER

Applicant notes with appreciation the Examiner's indication in paragraph 4 of the Office action that claims 5 and 10-17 would be allowable if rewritten into independent form. For the reasons given below, Applicant believes that the remaining claims are allowable as well, and respectfully request that the Examiner so indicate in the next Office action.

III. OBJECTION TO DRAWINGS

In paragraph 1 of the Office action, the Examiner has objected to Figure 1 of the drawings, asserting that it should be designated by the legend "Prior Art." Applicant has amended the drawings in the accompanying Replacement Sheet to so designate Figure 1. Accordingly, this objection should be withdrawn.

IV. OBVIOUSNESS REJECTION

In paragraph 3 of the Office action, the Examiner has rejected claims 1-4, 6-9, and 18 as obvious under 35 U.S.C. § 103(a) over Andersen (U.S. Patent No. 3,964,943) in view of Polese et al. (U.S. Patent No. 6,250,127). Applicant respectfully traverses this rejection and requests its reconsideration and withdrawal thereof.

The Examiner asserts that:

> Andersen discloses a SiC strip heating element comprising heating section (2), strip is non-hollow (Figures 1a-d), strip formed

> cold ends (3, 4), strip has a planar portion and a bent portion (Figure 2), strip is U-shaped (Figure 2), and strip has a curve in cross section (Figure 2). Andersen does not disclose an extruded strip with a cross sectional aspect ratio greater than 3:1, 5:1, 10:1, or 12:1.

Office action at paragraph 3. Applicant agrees with the Examiner that Andersen completely fails to disclose or suggest an extruded strip having a cross-sectional aspect ratio greater than 3:1.

However, Applicant takes issue with the Examiner's contention that Andersen discloses a strip element. The Examiner has not pointed to any portion of the disclosure where Andersen explicitly states that the resistor disclosed therein is in the form of a strip. The Examiner appears to reach this conclusion based solely upon Figure 1 of the drawings of Andersen (since no other citation to a different portion of Andersen is provided in the Office action). However, the drawings of Figure 1 are consistent with longitudinal sections of a heating element in rod form, having a narrower median section or "neck."

Indeed, Applicant contends that such "dumb-bell" shaped rods are conventional, as indicated in the first paragraph of Applicant's specification. The conventional nature of a dumb-bell shaped rod heating element strengthens the interpretation that such a rod is what is shown in Figure 1 of Andersen. Moreover, Figure 1 of Andersen is described therein as "diagrammatic," indicating that it is a schematic illustration of the method for producing the resistor, and therefore does not provide any specifics about the structure of the resistor that are not separately disclosed elsewhere in the specification. As a result, Applicant respectfully submits that the Examiner has incorrectly inferred that the Andersen resistor is in strip form, based only upon the diagrammatic drawing of Andersen.

A. No *Prima Facie* Case of Obviousness Exists

The Examiner goes on to state:

> Polese et al. discloses an extruded strip with a cross sectional aspect ratio greater than 3:1, 5:1, 10:1, or 12:1 (column 7, lines 7-14). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the cross sectional aspect ratio of Polese et al. in the heater of Andersen because, a cross sectional aspect ratio allows structures having low density and adjustable thermal expansion to be manufactured for use in electronic microcircuit components.

Office action, paragraph 3. Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness for at least the following reasons.

First, the Examiner asserts that it would have been obvious to use the cross-sectional aspect ratio of Polese et al. in the heater of Andersen to allow "structures having low density and adjustable thermal expansion to be manufactured for use in electronic microcircuit components." Applicant is claiming a furnace heating element, not a "structure used in electronic microcircuit components." Thus, even if the Examiner was correct in his characterization of the reference teachings and in his conclusion that the reference teachings were properly combinable, by his own admission, the result of the combination is not a furnace element, but a structure for use in electronic microcircuit components, i.e., not the claimed invention.

Second, the reference teachings are not properly combinable. Polese et al. form a strip by hot extruding an Al-SiC composite that is sufficiently ductile that it can be wound onto a pick-up spool. *See* Polese et al. at column 7, lines 6-14. The strip is then passed through heated rollers, to reduce its thickness even further, before it is suitable for use as a "flip-chip microprocessor lid." However, it is the entire width of the material that is subjected to extrusion into a strip and thinning by the rollers;

Polese et al. does not disclose or suggest a structure having a central portion that has a smaller thickness than the end portions, as is required by the disclosure of Andersen. Because the structures of Andersen and Polese et al. are completely different in this regard, it is completely inappropriate for the Examiner to draw any conclusions from the disclosure of Polese et al. with respect to the suitability or unsuitability of the structure disclosed in Andersen for use in electronic microcircuit components.

This is particularly true where, as here, neither Andersen nor Polese et al. disclose or suggest any need for the use of Andersen's heaters in electronic microcircuit components. Indeed, the Andersen heaters would appear to be singularly inappropriate for such an application since, in general, the problem encountered with heat transfer in electronic microcircuit components is keeping them cool, rather than heating them; this is supported by the very Polese et al. reference cited by the Examiner.

In addition, a worker of ordinary skill in the art would not have any reasonable expectation of successfully winding the SiC material of Andersen on a take-up reel or of thinning it by passing it through heated rollers; Andersen discloses that the median portion is achieved by grinding, not by the rolling procedure of Polese et al. (which would create a uniform thickness, not a narrowed median portion, as indicated above). *See* Andersen at column 2, lines 18-24. This is because SiC materials tend to be relatively brittle, a property that Polese et al. attempt to get around by forming a composite with large amounts of aluminum (60 vol% to 90 vol% at column 4, lines 6-14; about 80% in Example 1, of Polese et al.).

In light of the completely different art areas from which these references are drawn, the completely different materials from which the devices disclosed in each are made, the completely different methods for making them, and the completely different problems that these devices solve, Applicant respectfully submits that a worker of ordinary skill in the art to which Andersen relates would not have looked to Polese et al. for any teachings about how to modify the heater of Andersen. Moreover, such a worker, put in view of Polese et al., would have no reasonable expectation that the teachings of Polese et al. would provide any benefit to, or even be workable with, the device disclosed in Andersen. Accordingly, Applicant submits that this is not a situation where "a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way." *KSR Int'l v. Teleflex Inc.*, 550 U.S. __, 82 USPQ2d 1385, 1396 (2007). The devices are not similar, and there is no indication in either reference that using a strip form would improve the heater of Andersen at all, much less in the "same way" as the strip form "improves" the heat spreader in Polese et al.

Finally, even the MPEP recognizes that it is improper for an Examiner to pick and choose particular features of different prior art references and cobble them together to support a preconceived notion of obviousness. MPEP § 2143.01(II) states:

> The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art, and all teachings in the prior art must be considered to the extent that they are in analogous arts. Where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another.

(emphasis added). Accordingly, Applicant submits that it is improper for the Examiner to simply pick and choose the aspect ratio of Polese et al. and ignore the remainder of the reference teachings therein when attempting to combine the reference teachings. Applicant respectfully submits that, when all of the teachings of the cited prior art references are considered, as the MPEP requires, it is clear that a worker of ordinary skill in this art would never combine the teachings of Polese et al. with those of Andersen.

Andersen discloses the use of aluminum as a contact material for the ends of his heater because free silicon in the ends of the heater form a eutectic point with aluminum, so that the aluminum can be applied at a temperature lower than the melting point of pure aluminum. *See* Andersen at column 1, lines 60-65, wherein Andersen states:

> Particular advantage is achieved if there is applied to the end portions a metal which, with the free Si, forms a eutectic alloy which is largely resistively conducting. Such metals are known in semiconductor practice. Aluminium for example forms a eutectoid with silicon at approximately 570 C, . . . The contacts can therefore be applied at a relatively low temperature.

As a result, Andersen is able to mask the ends of the heater, etch away free Si from the median portion, leaving mostly SiC there, apply aluminum or other metal to the ends by, e.g., flame spraying, cathodic evaporation, or vapor deposition, and heating the device to a temperature above the eutectoid temperature to form the contact ends. *See* Andersen at column 3, lines 36-38. As a result:

> At relatively low temperatures such metals form with silicon a eutectoid that is resistively conducting. In this way there is obtained a mechanically and electrically stable resistive contact between the metal and the Si and SiC, by way of eutectoid. . . . When the median portion 2 of the body 5 glows, the end portions 3 and 4 are only slightly heated because of the presence of free Si.

> Consequently there is no danger of the melting temperature of the eutectoid being reached at the contacts 6 and 7 during operation.

Andersen at column 3, lines 32-36 and 40-45. In other words, Andersen clearly teaches that the aluminum in the ends of the heater should be kept away from the hot part of the heater.

Polese et al., by contrast, teach an entire strip that is made of an aluminum-silicon carbide composite. This is completely inconsistent with the fundamental teachings of Andersen that aluminum should be present only at the ends of the heater and separated from a central SiC portion by regions containing both SiC and Si. Equally significant, Applicant contends that the use of such a material would lead to a device that does not function as Andersen requires. The material would have such a low electrical resistivity that insufficient heating will occur for the median portion to become incandescent without the end portions also becoming incandescent. Applicant submits that such a device would not be able to withstand the high temperatures described by Andersen (which mentions a temperature of 2100 C in column 1, lines 15-17).

When the entire disclosure of both references are considered, rather than only selective portions thereof, it is apparent that combining the reference teachings renders the Andersen device unsuitable for its intended purpose. As a result, the combination of reference teachings is improper, as provided for in MPEP § 2143.01(V). For this reason as well, Applicant submits that a *prima facie* case of obviousness has not been established.

B. Any *Prima Facie* Case of Obviousness is Rebutted

Additionally, Applicant submits that any *prima facie* case of obviousness that might be said to exist is rebutted by the unexpected results described in Applicant's

specification at page 2, lines 1-5. Certainly there is no teaching in either of the cited references that using a furnace heating element in the form of a strip would result in additional power being provided from a heating element having similar cross-sectional area to that of a conventional tubular or solid element, or alternatively, that a similar power level could be obtained from a smaller and lighter element, using less mass of silicon carbide.

C. Conclusion

Applicant respectfully submits that, for at least the reasons given above, the obviousness rejections made by the Examiner should be withdrawn, and such action is respectfully requested.

Respectfully submitted,

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